NASA SBIR/STTR Technologies

STAR Booms Utilizing Resilient Structures Technology

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Proposal No.: 02-E1.04-8946

Identification and Significance of Innovation

Problem: Synthetic Thinned Aperture Radiometers (STAR) require large, linear arrays of rigid panels to be supported by a lightweight, stiff boom that is deployed from a very dense package. Existing technology is too heavy, bulky, and complex to deploy science instruments in a cost-effective, reliable manner.

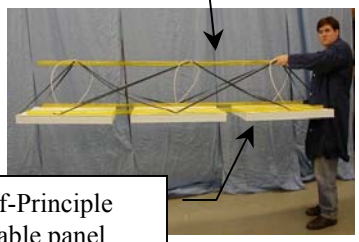
Solution: Foster-Miller, Starsys, and the Univ. of Colorado will develop flexible carbon fiber tubular trusses that collapse compactly and z-fold with the STAR or other antenna panels into a densely packed launch volume. The panels and structure deploy using the stored strain energy and are controlled by a simple redundant lanyard system. The high carbon fiber volume deployed structure is lightweight, efficient and dimensionally stable.

Lightweight, furlable, high modulus carbon tube trusses enable the deployment of very efficient structures

FMI Prototype ultra-high efficiency hierarchical structure

Furlable tubes enable dense, integral packaging of rigid panels and support structure

Structure unfurls to provide stiff backing for precision rigid panels



Proof-of-Principle deployable panel support demonstrator

Technical Objectives and Work Plan

Technical Objectives:

1. Develop design methodologies that predict the performance and range of applications of the structural approach
2. Demonstrate the structural performance of the approach through prototype structural testing
3. Show the packaged efficiency of the structure and develop approaches for deployment control

Work Plan:

Foster-Miller, Starsys and Harris will work together to develop the requirements and design of a high expansion deployed panel support boom. FMI will fabricate a prototype boom from high fiber volume, high modulus composites and the University of Colorado will test it for deployment repeatability, post deployment stability, precision and stiffness.

NASA and Non-NASA Applications

NASA: Large deployed rigid panel instruments such as Synthetic Thinned Aperture Radiometers, Synthetic Aperture Radars, high gain microwave antennae, solar arrays with higher performance rigid panels, large area deployed radiators as well as many other applications that require multiple panels to be rigidly supported.

Non-NASA: Communications antennae, DoD Reconnaissance mapping and surveillance instruments.

Contacts

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